



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,740	01/24/2002	Hong Guo	03745.0009	4249
22852	7590	08/23/2006	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			VO, LILIAN	
			ART UNIT	PAPER NUMBER
			2195	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/053,740	GUO ET AL.
	Examiner Lilian Vo	Art Unit 2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 07 June 2006.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1 - 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1 - 21 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date: _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date: _____	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

1. Claims 1 – 21 are pending.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 – 4, 7 – 9 and 13 – 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukuda et al. (“Two-level processor scheduling for multiprogrammed NUMA multiprocessors”, IEEE, 1993, pages 343 – 351, hereinafter Fukuda.

4. Regarding **claim 1**, Fukuda discloses a computer system comprising a cluster of node boards, each node board having least one central processor unit (CPU) and shared memory, said node boards being interconnected into groups of node boards providing access between the at least one central processing unit (CPU) and shared memory on different node boards, a scheduling system to schedule a job said node boards which have resources to execute one or more jobs (page 343, section 1, 1<sup>st</sup> paragraph, page 345 sub-section 3.1), said scheduling system comprising:

topology monitoring unit for monitoring a status CPUs and generating status information signals indicative of the status of each group of node boards (fig. 1, page 344 section 2); job scheduling unit for receiving said status information signals and a job, and scheduling the job to one group of node boards on the basis of which group of node boards have the resources required execute the job as indicated by the status information signals (fig. 1, page 344 section 1, 11<sup>th</sup> paragraph, page 344 section 2, page 346, sub-section 4.1).

5. Regarding **claim 2**, Fukuda discloses the scheduling system defined in claim 1 wherein the status information signals indicate which CPUs in each group of node boards have available resources, and, the job scheduling unit schedules a job to groups of node boards which have resources required to execute the job (page 344, sub-section 2.2, function of group creation request, page 346 sub-section 4.1).

6. Regarding **claim 3**, Fukuda discloses the status information signals for each group of node boards indicate a number of CPUs available at each radius (page 345, sub-section 2.2, function of group-termination request, function of the private scheduler), and wherein the job scheduling unit allocates the jobs to the one group of node boards on the basis of which group of node boards have CPUs available to execute jobs of a radius required to execute the job (page 344, sub-section 2.2).

7. Regarding **claim 4**, Fukuda discloses the cluster of node boards are located on separate hosts; and wherein the topology monitoring unit monitors the status of the CPUs in each host and

generates status information signals regarding groups of node boards each host (page 344 sub-section 2.2).

8. Regarding **claim 7**, Fukuda discloses a standard scheduler for allocating jobs to the one group of node boards (col. 2, lines 36 – 57: medium scheduler) and an external scheduler for receiving the status information signals from the topology monitoring unit and selecting the one group of node boards based on the status of the information signals (fig. 1, page 344 sub-section 2.1, page 346 section 4).

9. Regarding **claim 8**, Fukuda discloses if the job scheduling unit cannot locate a group of node boards which have the resources required execute the job scheduling unit delays allocation of the job until the status information signals indicate the resources required execute the job are available (page 345 sub-section 3.3.2).

10. Regarding **claim 9**, Fukuda discloses the access between the central processing units (CPUs) and shared memory on different node boards is non-uniform (abstract, page 343 section 1, 2<sup>nd</sup> paragraph).

11. **Claims 13 - 20** are rejected on the same ground as stated in claims 1 – 4 and 7 - 8 above.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 5 - 6, 10 - 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda et al. ("Two-level Processor Scheduling For Multi-programmed NUMA Multiprocessors", IEEE, 1993, pages 343-351), as applied in claim 1, and in view of Kubo (U.S. Patent No. 5881284).

14. As per **claim 5**, Fukuda teaches the invention substantially as claimed in claim 1 including the status information signals include, for each host, a number of CPUs which are available for each radius (pages 344, section 2).

Fukuda did not specifically teach the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job. However, Kubo teaches the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job (col. 3, lines 8-52). It would have been obvious to one of an ordinary skill in the art at the time the invention was made to have combined the teaching of Fukuda and Kubo because Kubo teaching of the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job would improve the integrity of Fukuda's system by providing a method of scheduling job

for enhancing a load balance between respective cluster in a clustered computer system (Kubo, col. 1 lines 6-8).

15. As per **claim 6**, Fukuda teaches that a job execution unit for receiving a job which has been scheduled to the selected host by the job scheduling unit, and allocating the job to the selected group of node boards; and wherein the job execution unit communicates with the topology monitoring unit to allocate the job to the group of node boards which the topology monitoring unit has determined have the resources required to execute the job (fig. 1, page 344, sub-section 2.1, page 346, section 4).

16. As per **claim 10**, Fukuda teaches the invention substantially as claimed including in a computer system comprising resources physically located in more than one module, said resources including a plurality of processors being interconnected by a number of interconnections in a physical topology providing non-uniform access to other resources of said computer system, a method of scheduling a job to said resources (page 343 section 1, 1<sup>st</sup> paragraph, page 345 sub-section 3.1) said method comprising the steps of:

- (a) periodically assessing a status of the resources and sending status information signals indicative of the status of the resources to a job scheduling unit (fig. 1, pages 344, section 2);
- (b) assessing, at the job scheduling unit, the resources required to execute a job (fig. 1, pages 344, section 2); and
- (d) scheduling the job to the resources which are available to execute the job as based on the status information signals and the physical topology, and the resources required to execute

the job (fig. 1, page 344, section 1, 11<sup>th</sup> paragraph, page 344, section 2, page 346, sub-section 4.1).

Fukuda did not specifically teaches comparing, at the job scheduling unit, the resources required to execute the job and resources available based on the status information signals. However, Kubo teaches comparing, at the job scheduling unit, the resources required to execute the job and resources available based on the status information signals (col. 3 lines 42 - 67, col. 4 lines 1-67, col. 5 lines 1-29). 20. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to have combined the teaching of Fukuda and Kubo because Kubo teaching of comparing, at the job scheduling unit, the resources required to execute the job and resources available based on the status information signals would improve the integrity of Fukuda's system by providing a method of scheduling job for enhancing a load balance between respective cluster in a clustered computer system (Kubo, col. 1 lines 6-8).

17. As per **claim 11**, Fukuda teaches periodically assessing the status of resources in each module and sending status information signals indicative of the status of the resources in each module to the job scheduling unit (fig. 1, pages 344, section 2), scheduling the job to the module having the most resources available to execute the job (fig. 1, page 344 section 1 11<sup>th</sup> paragraph, page 344, section 2, page 346, sub-section 4.1). Kubo teaches comparing the available resources in each module to the resources required to execute the job (col. 3 lines 42-67, col. 4 lines 1-67, col. 5 lines 1-29).

18. As per **claim 12**, it is rejected for the same reason as claim 11. In addition, Kubo teaches scheduling the job to the module which has a largest number of available processors at the required radius based on the module status information signals and the physical topology (col. 3 lines 8-52, col. 5 lines 1-29).

19. As per **claim 21**, Kubo teaches scheduling unit schedules jobs to the module having a greatest number of available processors of a radius required to execute the job (col. 3 lines 8-52, col. 5 lines 1-29).

***Response to Arguments***

20. Applicant's arguments filed 6/7/06 have been fully considered but they are not persuasive for the reasons set forth below.

21. Applicant argues that "Fukuda does not disclose each and every element of Applicants' claimed invention. Claim 1 calls for a combination including, for example, "a topology monitoring unit for monitoring a status of the CPUs and generating status information signals indicative of the status of each group of node boards" (page 5 1<sup>st</sup> paragraph), the examiner disagrees. Fukuda discloses and/or suggests "a topology monitoring unit for monitoring a status CPUs and generating status information signals indicative of the status of each group of node boards (fig. 1, page 344 section 2).

22. Applicant argues that Fukuda fails to teach or suggests “a job scheduling unit for receiving said status information signals and a job, and scheduling the job to one group of node boards on the basis of which group of node boards have the resources required execute the job as indicated by the status information signals” (page 5 last paragraph), the examiner disagrees. Fukuda discloses and/or suggests a job scheduling unit for receiving said status information signals and a job, and scheduling the job to one group of node boards on the basis of which group of node boards have the resources required execute the job as indicated by the status information signals (fig. 1, page 344 section 1, 11<sup>th</sup> paragraph, page 344 section 2, page 346, sub-section 4.1).

23. Applicant argues that Fukuda fails to teach or suggests “the status information signals for each group of node boards indicate a number of CPUs available at each radius, and wherein the job scheduling unit allocates the jobs to the one group of node boards on the basis of which group of node boards have CPUs available to execute jobs of a radius required to execute the job” (page 7 last paragraph – page 8 1<sup>st</sup> paragraph), the examiner disagrees. Fukuda discloses and/or suggests the status information signals for each group of node boards indicate a number of CPUs available at each radius (page 345, sub-section 2.2, function of group-termination request, function of the private scheduler), and wherein the job scheduling unit allocates the jobs to the one group of node boards on the basis of which group of node boards have CPUs available to execute jobs of a radius required to execute the job (page 344, sub-section 2.2).

24. Applicant argues that neither Fukuda nor Kubo discloses “the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job” (page 10), the examiner disagrees. Kubo teaches the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job (col. 3, lines 8-52). It would have been obvious to one of an ordinary skill in the art at the time the invention was made to have combined the teaching of Fukuda and Kubo because Kubo teaching of the scheduling unit maps the job to a selected host having a maximum number of CPUs available at a radius corresponding to the required radius for the job would improve the integrity of Fukuda's system by providing a method of scheduling job for enhancing a load balance between respective cluster in a clustered computer system (Kubo, col. 1 lines 6-8).

25. Applicant argues that neither Fukuda nor Kubo discloses “scheduling the job to the resources which are available to execute the job as based on the status information signals and the physical topology, and the resources required to execute the job” (page 11), the examiner disagrees. Fukuda discloses scheduling the job to the resources which are available to execute the job as based on the status information signals and the physical topology, and the resources required to execute the job (fig. 1, page 344, section 1, 11<sup>th</sup> paragraph, page 344, section 2, page 346, sub-section 4.1).

***Conclusion***

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lilian Vo whose telephone number is 571-272-3774. The examiner can normally be reached on Thursday 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lilian Vo  
Examiner  
Art Unit 2195

lv  
August 17, 2006

  
LILIAN T. VO  
SUPERVISORY PATENT EXAMINER